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THE JOURNAL OF PHILOSOPHY

A TENTATIVE ANALYSIS OF THE PRIMARY DATA OF PSYCHOLOGY.

IN the attempt to understand the conditions of psychological reactions students of behavior and especially human behavior are experiencing a need to analyze more thoroughly and to describe more exactly the fundamental data with which they are working. And what are these fundamental data? Obviously, responses to stimuli. At once we are plunged into an investigation of the essential principles of human adjustment because our first acquaintance with behavior indicates conclusively that stimuli and responses are polar phases of a single occurrence. We can not understand the response without an examination of the stimulus, nor can we isolate or handle adequately the stimulus without an investigation of the complete segment of behavior in which both play or have played a part. We may, then, state our present problem as an attempt to clarify the natures of (1) a stimulus, (2) a response, and (3) a segment of behavior.

I

Let us begin our study by a consideration of the segment of behavior, which from the standpoint of scientific psychology we look upon as an arbitrarily selected portion of the activities of a person or animal. The point is that whenever the psychologist undertakes to describe a reaction of an organism he must, in order to have any description at all, divide off, as a definite portion of behavior, the adjustment in which he is interested from its predecessors and successors in the chain or stream of actions. In this manner the psychologist obtains, in spite of the difficulties of the material, a workable descriptive unit. Now when we consider the extreme complexity and manifoldness of human action we must agree that unless we include in our unit as many factors as possible we stultify our descriptions and make them too abstract for any use. Consequently, we shall find that the psychological unit is always the most conveniently isolated series of responses to stimuli which can be said to represent a definite specific adaptation. Such an adaption is exemplified by jumping out of the path of a flying missile, or picking up a book. To this unit of adjustment we apply the term "pattern of response."

A pattern of response is, therefore, in every instance an extremely variable and unique sequence of processes, although in similar stimulating circumstances a describable uniformity may be observed. Such uniformity as we can observe in the organism's adjustments constitutes the basis for the predictability of psychological behavior, and we may trace this uniformity in the pattern of response to the presence in it of one or more definite response systems. Consider the responses of a person in a tennis game in which certain stimuli in the form of a special play are offered him. Knowing something of the person and the conditions of his acquiring and retaining certain reaction systems, one may expect a particular kind of response play from him, and although we may know nothing of the responses accompanying the tennis adjustments proper, such as the player's thoughts, whether related or unrelated to the game, his subvocal utterances and other byplay responses which always form part of such a segment of behavior, still the central phase of the adjustment mentioned, or the tennis playing as a series of definite reaction systems, will characterize for us the total segment of behavior. In this particular case the segment of behavior will coincide pretty well with what we ordinarily call the "form" of play, and the predictability phase of the person's playing will appear in the observation whether the player is or is not true to form.

Although the uniformity of a segment of behavior is ascribable primarily to the presence in it of one or more definite response systems, still we must not overlook other factors responsible for the similarity of behavior. And first we must mention the similarity of the stimuli and of their settings, for it is obvious that the same objects appearing under the same auspices will call out the same responses. Moreover, we must not fail to consider another prominent factor in the similarity of the responses, namely, the precise conditions of the individual at the times when the actions are performed.

How important the pattern of response really is as a unit of description may be seen from the consideration that only by studying the conditions of operation of a reaction system, besides the processes coordinate with it, can we thoroughly understand it. The problems of inhibition and delay of responses can only be solved by reference to the interplay of various stimulating objects in the segment of behavior. Again, the affective coloring and the temporal duration of an adjustment can not be understood without an examination of many of the conditioning events which accompany the operation of the given reaction systems within the compass of the psychological act under investigation. The same proposition may be asserted concerning the rapidity and accuracy of any act. Briefly, we may

repeat that to learn anything more than that a given reaction system has functioned we must study the behavior setting of any given reaction system; we must study the pattern of response. Possibly the point we are attempting to make would be most emphasized by observing that what the psychologist calls illusions are merely situations in which certain reaction systems are being called out not by the appropriate stimuli, but by some other stimuli within the confines of the segment of behavior studied. Of course, when we attend to the stimulus, we might say rather that the particular stimulus has called out an inappropriate response, but the mechanism is the same whichever way we look at the matter.

Two types of reaction sequences can be isolated in any given segment of behavior. These are (1) the highly variable series of reactions we have already referred to, namely, the central reaction system or systems, with the byplay responses, and (2) the orderly and logically temporal series of reactions which may be analyzed as follows: (*a*) the preparatory attention response, (*b*) the anticipatory or precurrent reaction, which may be a perceptual or partially incipient act, an ideational or completely incipient response, or some other fully overt act, and (*c*) a final overt or consummatory act which we may name an emotional, volitional, thought or habit response. Any reaction under (*c*) may of course be a member of a chain of precurrent reactions which precedes some final adjustment, which final adjustment may likewise be an ideational or incipient reaction. Thus we may find that an emotional reaction, for example, may be a response anticipatory to a final adjustment, which may be either a definite overt act or a thought reaction.

Further, we must note that any member-reaction of a segment series may be an integration of simpler reactions. If, for example, a precurrent reaction to placing a book on the table is taking it out of a group of books, we can readily see that this latter act may comprise a series of coordinate eye-hand acts. As a matter of fact no limit can be prescribed to the development of the integrations in human behavior, especially when we consider the enormous possibilities for the combination of implicit and overt behavior of various sorts.

Such an analysis as we have made of the pattern of response affords us some slight insight into the varieties of acts which comprise actual adaptations to our everyday surroundings. In the first place, we can see what the basis is for the simplicity or complexity of our adjustments. A psychological act is simple when it contains few precurrent response systems, and the limit to such simplicity would be the case in which the distinction between the precurrent and consummatory reaction systems disappears entirely, as the

reflex segment of behavior illustrates. In the most complex behavior segments we find large series of precurrent responses anticipating the final adjustment to some stimulating object.

Further information gained from a study of segments of behavior concerns the qualitative differences in adjustments. Thus an act which consists primarily of overt reaction systems will turn out to be what is ordinarily known as a motor response, while segments of behavior in which implicit reactions predominate will be described by the conventional psychological term of reasoning. Of course, in these complex segments there never is an exclusive series of one type, but the predominant type colors the total act. Although it is not always true, yet for the most part whenever we have a large series of precurrent responses there are many discriminative phases and the total act takes on the characteristics of intelligent behavior. Again, we may observe that great variety is introduced in complex behavior by the presence in it of language reactions. Language reactions constitute the most subtle and at the same time the most efficient sort of precurrent responses; they make it possible for the person to preface his final acts by many incipient responses, for language reactions enable us to perform actions in prospect and to determine the results of such actions before actually accomplishing them. Obviously the rational segments of behavior and those constituting voluntary action will include many language reaction systems.

What is ordinarily called subconscious activity we may determine upon analysis to be complex segments of behavior from which communicative language responses are absent. It must be understood that *only* communicative language responses are absent, for subconscious acts may be replete with automatized language reactions, which are quite different things.

II

A stimulus is any object or thing which can call out a response in the organism. By object or thing we designate any actual element in the surroundings of an individual, thus using the terms in an absolutely common-sense manner. We must include among those elements trees, stones, wind, air, temperature, laws, customs, morals, ideals, *etc.*, in short, everything which influences our actions. Nor are stimuli confined exclusively to objects, for in a genuine sense we also respond specifically to the colors, tastes, odors, shapes, sizes, and other qualities of objects. Furthermore, we must add to our list of stimuli, besides objects and their qualities, all sorts of events and conditions. When we interest ourselves in the precise conditions of

psychological behavior we find that the human organism reacts to various sorts of circumstances as well as to objects. To a certain extent we may see in this fact of the extensive range of adaptational situations an important psychological difference between man and the other animals. Exceedingly significant among stimuli are the actions of the organism itself. No inconsiderable proportion of an organism's activities can be directly traced to its own immediately antecedent reactions. This fact has been most exploited by psychologists with reference to the series of reactions involved in a train of thought. Indefinitely more striking than thoughts as stimuli, however, are the various reflex actions, especially of the secretory sort. How replete the literature of psychology is with discussions concerning mysterious forces or drives controlling the actions of organisms, and simply because in many instances the writers mistake the ordinary biological-function factors of reflexes, such as the secretions of the reproductive organs, for manifestations of superbehavioristic forces.

Now crudely we may classify all the stimuli into three kinds, namely, natural, social and cultural. The first type includes all of the objects which can stimulate the lower strata of psychological organisms in common with the human species. Under the rubric of social stimuli we may consider all the objects which surround us by virtue of our living in human groups. Here we may mention such things as laws, customs, opinions, *etc.* Also this class includes all of the natural objects which have undergone modification because of the human group needs. Salient among the objects of the third class are the personal ideals of individuals which in a genuine sense are developed in the person's own experience.

Especially important is it to distinguish between the stimulus proper and the medium of contact (light rays, air waves) operating between the stimulating object and the stimulated person. This distinction is all the more important because much confusion inimical to the understanding of psychological behavior can be thereby avoided. Usually these media of contact are thought to be the stimuli and in consequence the reactions are presumed to be types of knowledge functions consisting of the presence in the knowing mind of states induced by the media of stimulation. In detail, the existence is supposed of a one-to-one correspondence between types of light rays or sound waves and specialized qualities in the mind. A serious error arises from such a view which is no less than the implication that the objects to which we adapt ourselves do not exist until after the light rays, *etc.*, "arouse the consciousness of their qualities." From the view that the sound waves, *etc.*, are the inseparable correlates of the qualities of objects, it follows that look-

ing upon the media as the stimuli commits one to a psychological parallelism, or to express it otherwise, a subjectivism.

To all of this we counterpropose the hypothesis that the light rays, heat rays, *etc.*, are simply the means whereby the organism gets into contact with the stimulating objects. A little reflection will convince us of the merit of this view, for can we not and do we not adapt ourselves to objects in the absence of any one or all but one of the large variety of media of perceptual stimulation? And of course in all ideational behavior they are entirely absent.

But let us not be at all understood as minimizing in any sense the necessity for and importance of some medium of response, since certainly, when we are merely in distance contact with an object and the light rays are removed, we can not make any immediate and overt response to that object. Moreover, we find that changes in the media introduce all sorts of possible complexities in the reaction situation, such as the distortion effects which are especially well exemplified by the stick bent in water. On the other hand, however, no quality of the response can be attributed to the mere presence of the medium of contact.

How important it is to distinguish between stimulating objects and media of stimulation may be judged from the fact that the presence or absence of such media marks the difference between psychological reactions on the one hand and biological and physical activity on the other. In the physical domain we find no action induced in an object by some other object which is not measurable as an absolute equivalent of the energy expended by the other. In other words, physical objects can only operate directly and immediately upon one another. Hence physical actions are evaluated in terms and propositions of inertia. In general, physical objects are not possessed of action systems which can be put into operation by some surrogate of the original stimulus object.

Less immediate is the operation of one thing upon another in the case of purely biological organisms, for here we have a type of organization in which it is not improper to say actions can be stored up, later to be put into operation. Consequently, the biological organism can be periodically stimulated to action which is entirely out of proportion to the force exerted upon it by the stimulating object. In tropismic action, while the range of movement is limited and the type of action is constant, the organism may still be said to be spontaneous. In other words, the biological organism has developed the beginnings of sensitivity to media of contact, although such media are identical or very intimately related with the stimulating object. This type of sensitivity in biological literature is given the name irritability. From a scientific standpoint it is clear, of

course, that these differences are all variations in the workings of different types of objects.

Consider now how differently the psychological organism is related to the objects which provide it the occasions for adjustment. Here the organism is so spontaneous and independent of the stimulating object that the former can be influenced to act by a variety of phases of the stimulating object. This condition is brought about by the objects building up, in the reactional equipment of the individual, response systems which are put into operation through the instrumentality of a variety of contact media. The psychological organism may be equipped with reaction systems so that it can be aroused to action by either the sight, sound, taste, touch, or other contact with an object. Through the use of contact media, the psychological organism can not only adapt itself to objects distantly placed, but it has been able to evolve an infinite variety of response forms and integrations to the end of acquiring delayed and inhibitory responses of all sorts, besides differential or cognitive behavior.

To psychologists' traditional neglect of the distinction between a stimulus and its medium of contact we might ascribe the responsibility for much futile discussion concerning reactions to pain. The phenomena of pain have always seemed to stand in the way of a naturalistic psychology, such phenomena being the stronghold of subjectivism, because it appeared impossible to think of pain as a quality of an object in precisely the same sense as is red or sour.

Whoever takes cognizance of this problem may see that the difficulty in interpreting pain phenomena has been due to the failure of psychologists to consider the various peculiarities in such phenomena with respect to the media of stimulation. For one thing, since pain reactions involve such destructive media of stimulation as pricking, cutting, or otherwise lacerating tissue, it is easy for us to confuse such reactions with the stimulating conditions. In consequence, it truly appears that pain is more intimately connected with the person than is true even in the case of pressure responses. From this fact as a starting point, and from the observation that pain-inflicting objects do not themselves perform the pain reactions, it was a simple step to the curious but no less common argument that pain must be in the mind since it can not be in the knife.

Furthermore, it is safe to say that when objectively we study stimulating objects, the media of stimulation, and the reactions to things as isolated phases of psychological phenomena, we will learn more concerning human behavior than is now the case. For example, much have we yet to learn concerning the qualities of electrical phenomena and their effects upon us, could we but keep distinct our

reactions from the media of stimulation, and thereby study the means of our reception of the stimulating media.

The Stimulus and its Setting. An objective study of human reactions must include in its programme of investigation, besides the media of stimulating objects, also the settings of the stimuli to which adjustments are made. For it is an indubitable fact that the person is stimulated not only by things but also by the setting or background of the objects. From a behavior standpoint the setting of the stimulus object is of extreme importance in influencing the behavior of the individual in conditioning in a large way what the person will do. A striking illustration of this fact is found in the activities of an individual reaction to a social outrage, both when the stimulus is in and out of a mob setting. Plainly we can determine that whatever differences there are in a person's behavior to the same stimulus, as in our example, they are all to be accounted for on the basis of varying conditions of the stimulating situation.

Illusions, when they occur, are to a considerable extent unexpected forms of response accountable upon the basis of the modification in the setting. Thus we may account for errors in reading by observing that the reaction which occurs is due to the failure of the stimulus to be coupled with its customary associates. The phenomena of contrast to a very considerable extent can also be described in terms of changes brought about in stimulating objects by the proximity of various kinds of surrounding things.

To conceive of stimuli as contained in a general setting conduces to an understanding of a further absolutely essential characteristic of stimuli, namely, their interrelatedness or chainlike connection. The study of complex behavior becomes futile when we presume that stimuli are each and severally unique and independent arousers of activity. Such a circumstance does not exist at all, as we indeed infer from our study of the pattern of response. Almost every situation in which we act involves a definite series of stimulations which may be intricately related one with another. The appreciation of the serial form of stimuli provides us with some insight into those complex serial responses which are generally purported to be the working out of instincts. Instead of believing in the existence of mental states manifesting themselves in a variety of connected actions, we can account for such groups of activities as direct responses to chains of interconnected stimuli. For instance, the specific acts which the individual performs in a protracted physical contest depend each upon the continuity of the series of stimulations offered by the rival contestant.

The Classification of Stimuli. Stimuli may be distinguished from each other upon a functional basis. In the first place, we may

differentiate between stimuli which call out overt responses directed toward an object present, and ordinarily called perceptual acts, and those stimuli which bring to action implicit (ideational) activities. Under the overt class we distinguish primary and accessory arousers to action, while under the implicit division we may place direct and substitution stimuli as per the following table:

For overt responses: { (1) Primary stimuli. (2) Accessory stimuli.

For implicit responses: { (3) Direct stimuli. (4) Substitution stimuli.

1. Overt or perceptual responses are aroused to action by the original object or situation which excited them to action from the beginning. A primary stimulus may be thought of as the object which is naturally associated with a given response, or we might say that a primary stimulus is the object which calls out a congenital response, or which is responsible for the building up of a particular response in the organism. The primary stimuli are objects in the surroundings which bring into operation original differential responses. The clearest examples in nature of such stimuli are the objects and conditions which arouse reflexes and instincts, in short, any type of congenital response system.

2. Whatever happens to be the adequate stimulus for a given response system, it is still possible to evoke that response system by stimulating with an adjunct or an accessory stimulus object. The experimental demonstration of this phenomenon is found in the now universally familiar conditioned reflex. The probabilities are that there may be several accessory stimuli attaching to a given reaction system, although this has not yet been experimentally verified.

3. Both the primary and accessory stimulation objects are directly in contact with the reacting organism, and the acts in which they function may be considered as directly observable behavior. In the domain of human psychology at least, there occur many acts which are not always observed by other than the acting individual if they are observed at all. For practical purposes we may call these types of responses thought actions. Now such implicit reactions may be called out (1) either by the object itself which is reacted to, or (2) by some other object or situation which may then be said to substitute for the original object to which the adjustment is made. A direct stimulus to an implicit act would therefore be the person of whom one is thinking, or the event in which one is planning to participate. Clearly then the person must be in immediate contact with the original object or event in order to be directly stimulated thereby.

4. In contrast to the direct stimulus, the substitution stimulus is the excitant of a response originally acquired by contact with some other object. One goes to visit some particular friend because of being reminded of him by meeting a very close friend of the former. In such a case the response is evoked by an object serving as a substitution for the object actually reacted to. Naturally enough we can trace out various conditioning factors which make possible the substitution of stimulating objects, among which are the resemblance, the common or similar use of objects, and the contextual relation of things. Apparent it is, then, that the substitution stimulus is an essential factor in all memorial and thought behavior.

It may be justifiably urged that our description of the substitution stimulus merely depicts the circumstances of any stimulus correlated with a recognition response, since every recognition reaction is indirectly aroused. Also, it might be said that every overt response involves a substitution of stimuli even though the stimulating object be the same, since every response succeeding the original adjustment must perforce be stimulated by a representative of the original object associated with the original response. In seeking for a trustworthy guide to distinguish between a substitution and a direct stimulus, we observe the following fact, namely, that whereas in the non-substitution situation the acting stimulus is one that would ordinarily call out the response in question because of an original coordination between the two, in the case of the genuine substitution, on the contrary, no such connection exists.

The operation of the substitution stimulus is clear-cut when we consider the delayed reaction in which there are several intermediary responses preceding the final actual adjustment. In such a delayed reaction some object evokes an implicit or incipient response, which in turn serves as a stimulus to some other incipient response, until finally the consummatory adjustment is made. We look upon the final adjustment as the adequate reaction to some object or situation, and as we see, it is in the end made to operate by some object or situation other than the one finally adjusted to.

III

The adjustment unit of a behavior segment is the operation of a reaction system. This system by virtue of the fact that it is an act of an organism or a person can be analyzed into a series of component functions. These components represent (1) simple acts which unite to form a larger whole such as the integration of letter strokes into word wholes in typewriting, (2) the integration of definite anticipatory and consummatory phases of an act to become a part of a

larger act, and (3) logically derived elements of a single reaction of an organism to a stimulating object. The fact is that the integrative character of psychological reactions makes it possible for all of the phases of a simple adjustment to become a single phase of a more complex reaction. The response system is, then, a unitary organismal adjustment to a stimulus and is abstracted from a pattern of response in a segment of behavior. In the following table are summarized all of the salient features of the response system:

1. Discriminative phase.
2. Conative phase, the preparatory attitude of the organism brought about through the media of stimulation, air waves, for example.
3. Affective factor, tension, strain, relief, pleasantness, *etc.*
4. Action of receptor mechanism.
5. Action of afferent transmission system (nervous conduction).
6. Action of central adjustor (synaptic coordination).
7. Action of efferent transmission system (nervous conduction).
8. Action of effector mechanism.
9. Muscular and (or) glandular phase.

Probably none of the components require any particular explanation, but in order to obviate any parallelistic interpretation of any phase of the response system we might elucidate briefly the first three members in the table.

1. The discriminative function refers to that characteristic of a psychological reaction which we might designate as the differential response. A fact of nature it is that the psychological organism acts in a distinct and specific way in the presence of different objects, or when the same objects are in different settings. This capacity of making differential responses is based upon the differential sensitivity of an organism to different qualities of things, such as colors and tastes and their respective media of stimulation, and is an elementary fact precisely as is the fact of electrostatic induction. By constant contact with numerous objects the responses become so specialized and unique as to merit the name of knowledge and when the responses are not only discriminative but anticipatory also, the reactions can be called intelligent and reflective. With the increase of the contacts of the organism with the surrounding objects the responses become, of course, more and more complexly integrated and the organism's adaptations to particular classes of things may become highly intelligent and capable.

2. By the conative component of a reaction system is meant the susceptibility of an organism to vary its position and attitude toward a stimulus because of being attracted to it through a medium

of contact. When light, air, or heat radiations come into contact with the organism they put it into a state of preparation for action upon some new stimulating object. In a genuine sense we might think of the conative characteristics of a reaction system as the factor which influences the person or organism to react to any given stimulus, since the conative factor refers to the set of the organism and the precise means in which this set is brought about. In many cases it is precisely the ease with which an organism can be set for a response to some stimulus which may condition the occurrence of the adjustment at all. Moreover, any reaction may be decidedly modified by the mode of getting set. Thus the jerkiness of a pain reflex may be ascribed to the way in which the medium of stimulation influences the organism to prepare for an adjustment. In general, the direct contact media of stimulation bring about more active and prompt preparation for responses. Very important in influencing the form of the conative factor in reactions is the number of receptors which are in contact with media of stimulation at the same time.

3. The affective factor or feeling phase of a reaction system refers to the general condition of the organism before the present stimulation, which condition greatly modifies the present reaction. Also the organism is conditioned by the present response and carries over the feeling to future conduct. The feeling factor may be described as calmness, relief, strain, tension, pleasantness, excitement, satisfaction, *etc.*, and depends to a considerable extent upon the physiological condition of the person.

In general, it must be observed that the three components of the response system which we have been describing refer much more to the functioning of the complete organism than is true of the other components. Strictly speaking, of course, none of the components can be considered as anything but an abstraction from a total unitary activity. It is possible, however, in all but the three cases specified, to correlate the components with the activity of a part of the organism in the form of specific anatomical structures (glands, muscles, end organs, nervous structures). The fact that these three former components of the reaction system can not be correlated with anything but the total activity of the organism is doubtless in large part responsible for parallelistic hypotheses. Moreover, the fact that these three components may constitute predominant phases of anticipatory reactions antedating a final adjustment, which may seem to be predominately muscular and glandular, gives rise to the notion of the uniqueness of these components.

The Classification of Reactions. Such complex phenomena as response systems naturally can not be simply classified or described

from a single standpoint. We propose, therefore, to enumerate the outstanding characteristics from several logically uncoordinated angles.

1. *Connate and Acquired Responses.* Since the psychological organism is likewise a biological organism its development parallels the unfolding of the animal form. Each starts with a complement of functions which develop to greater and greater complexity in accordance with the needs of the individual. Thus the psychological organism comes into the world equipped with definite response systems, which may be considered as the genetic prototypes of all the future response patterns of the particular individual. In other words, the complex reactions of the mature individual are developed by a process of interaction of the organism with surrounding objects on the basis of the connate action systems.

Although there seems to be no logical objection to the proposition that all responses are developed from these crude connate beginnings, yet the reactions of a mature person are so absolutely unlike the connate systems that they must be looked upon as qualitatively different. That is to say, the description of them should be in no wise compromised by the fact of their humble origin. For after all the facts of psychological phenomena are best described by considering reactions as directly deservable responses to definite stimuli. In other words, the acquired reactions which operate in our highly integrated and controlled adjustments such as thought and memory adaptations should be described as they arise to meet the needs of the organism, and as they operate and are controlled by the stimulating circumstances in which they function. Probably the best attitude toward the problem under discussion is the careful observance of both the continuity of the individual's behavior development, and the full factual description of any present reaction.

As samples of connate response systems we may cite the actions usually described as reflexes, instincts as found in the animal and infant, and random movements as found in infants. Among the acquired response systems we will naturally find the most complex integrations of behavior factors and as a typical example of them we may mention the communicative language responses, as well as all the behavior units which function in our multivaried acts of skill.

2. *Actual and Potential Reaction Systems.* Another mode of classifying reaction systems is the consideration of them as actually occurring responses in the presence of their adequate stimuli, or as latent forms of adaptation to surrounding objects when the stimuli are not operating. Under the former heading we may place all the actually functioning responses of the organism at the moment, while under the latter class we place all those responses which the individ-

ual will perform when surrounded by different objects and persons. Obviously, we can not at any instant acquaint ourselves with the complete adaptational equipment of any individual, and thus arises the necessity for performance or efficiency tests. Apparently the difference between the two types of responses reduces itself to a degree of connection with a stimulus, but the classification points to the unmistakable presence of response systems in the individual prior to their excitation by stimuli. In other words, by the term latent response we mean only to point out that the person as a psychological machine may be expected to respond in a certain way, whenever he is offered a particular stimulus, provided he has acquired the necessary response system and it is not for any reason prevented from operating. And all this in precisely the same sense in which the automobile salesman informs us that his machine will operate under definite stated conditions, although the automobile may not at that moment be actually running.

Naturally the range of potential responses includes all of the various action systems, which, when they occur, exhibit to us the precise nature or character of the person. That is to say, it will include not only the reflexes and simple habit responses but also the most complex social and intellectual activities. Let us observe at this point that whenever the terms tendency or disposition are properly used in psychology they must refer to just such particular latent reaction systems which constitute the capacities of the person when those systems are not acting, and which are the performances of the individual when they do function. Immediately upon the presentation of their stimuli these latent response systems are aroused to activity and become actual responses.

3. *Delayed and Immediate Responses.* Students of behavior in their first contacts with psychological phenomena observe the immediacy of certain responses and their more or less protracted delay, in the individual's final adjustment in other cases. Now this difference in reaction is not merely a matter of an interpolated time interval between the appearance of the stimulus and the occurrence of the response, but rather an interpolation of precurrent responses between the final response (considered the response in question) and the appearance of the stimulating object or situation.

The immediate responses can be best understood by observing that the segment of behavior in which they occur is limited to a single or a very few responses. It is for this reason that there is a close correlation between immediate responses and the simple reflex type of action. Here the first action called out by the given stimulus is at the same time the final adjustment.

In contrast to the immediate responses we find that in some seg-

ments of behavior there are series of responses resulting in a final adjustment. In these delayed responses a definite attention adjustment may be followed by a definite perceptual or ideational reaction or a series of such reactions; then finally a consummatory response will follow. Also in complex voluntary reactions we may find numerous language responses interpolated between the stimulus and the consummatory response.

Different varieties of delayed responses are found in organisms, but we can distinguish between at least two fairly clear-cut types. In the first of these types all the interpolated responses are overt reactions,[1] while in the second type the precurrent acts are language reactions or ideational processes. Naturally, the ideational or language precurrent responses are more efficient and allow for a longer time interval between stimuli and responses, and, what is more important, pave the way for the development of extremely complex behavior.

4. *Temporary and Permanent Reactions.* One of the most obvious facts about reactions is their constant waxing and waning. The former phenomenon finds its best known expression in the perseverant activity while the waning character of reactions is found in the process of forgetting. Many responses there are which remain permanently with the individual and operate in the presence of their adequate stimuli. These responses we call permanent and they are illustrated by the informational and skill reactions which give character to the individual.

Among the temporary responses are the memorial actions, which are pressed into service for a given limited period. These temporary responses do not disappear completely from the reactional equipment of the person, but they are merely disengaged from the stimulating situations to which they once were attached. Familiar psychological phenomena which throw light upon the nature of permanent and temporary responses are the amnesias and aphasias which illustrate conditions in which parts of the permanent reactional equipment of the person are temporarily lost, or we might say operate as though they were really temporary response systems.

5. *Explicit and Implicit Reactions.* Among the most important of distinctions between responses is that of the explicit and implicit response systems. Briefly, we might differentiate between these two types of responses by pointing out that in the former case some actual operation is performed upon the stimulating object while the implicit act can never be anything but a precurrent response to some final adjustment which produces some effect upon an object.

In every case an implicit response is a vestigial remnant of some

[1] Such as bodily orientations; *cf.* Watson, *Behavior*, p. 227.

original overt act or an incipient functioning of the whole. Because the implicit action is subtly and rapidly performed it constitutes the basis for all sorts of thinking operations. Probably the best examples of implicit responses to objects and situations are thinking and dream activities. Thoughts or ideational activities are nothing more than a subtle and symbolic repeating of responses previously performed upon some object or situation. Being vestigial responses, implicit acts may take on a large variety of symbolic forms, so that an ideational activity may be in the widest sense representative of any given act. In some cases the representing act may function more like an overt than an incipient response showing the possibility of substituting reactions, one for another. This substitution of responses is of primary importance for the integration of complex response systems.

6. *General and Specific Reaction Systems.* Although reaction systems must be considered as definite responses to specific stimuli, still we can differentiate between those systems which are aroused to action by classes of things rather than by individual objects. As we consider the order of complexity in our reactions we find that the simpler adjustments to natural surroundings are excited to action by purely individual and specific stimuli, while in the more complex social responses the stimuli may be indifferent individuals of a type of thing or event. In the complex behavior equipment of the person we find, for example, that any elderly person may stimulate us to offer him our seat. Similarly, the acts of any person may arouse our proffer of thanks. Precisely the same reactions will serve as generalized adjustments to any individual stimulus of a given class. Again, we acquire responses not to tamper with anything but that which is definitely our own property. Especially noticeable in our equipment of generalized reaction systems are negative or inhibiting responses.

IV

Fragmentary and schematic as the above analysis of psychological phenomena is, it does, we still believe, suggest some of the salient characteristics of the elementary processes involved in psychological activity. Not the least valuable aspect of such an analysis is the essential implication that psychological phenomena are the actions of a complex and highly organized individual. In effect, this means that psychology must always employ itself with data that are dynamic in character, in the sense that they are reactions to surrounding objects or things and not manifestations of complex cellular organization and functions, or of some hidden mind or soul. Considered as the operation of a psychological machine, the data of psychology are,

theoretically at least, subject to precise natural description and formulation into laws. To be sure, psychologists can not, because of the nature of the facts with which they deal, hope to duplicate in their domain the exactness and simplicity of physical formulations, but they can exclude from psychology all animistic prepossession and unscientific description.

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IS SUPERNATURALISTIC BELIEF ESSENTIAL IN A DEFINITION OF RELIGION?

IN a previous article in this JOURNAL,[1] devoted chiefly to a consideration of William James's philosophy of religion, I discussed what I called the *fallacy of false attribution,* which, I said, "consists in the erroneous interpretation of an experience whereby the experience is attributed to an external, divine source in cases where a physiological explanation is adequate to account for it." James leaves us in no doubt as to his acceptance of supernaturalism, and his consequent commission of the *fallacy of false attribution* when he appeals to the so-called religious experience as evidence for the truth of religion. In *The Varieties of Religious Experience* he says, "If one should make a division of all thinkers into naturalists and supernaturalists, I should undoubtedly have to go, along with most philosophers, into the supernaturalist branch" (p. 520). He further classifies himself as what he calls a "piecemeal" supernaturalist. "Piecemeal" supernaturalism, he says, "admits miracles and providential leadings, and finds no intellectual difficulty in mixing the ideal and the real worlds together by interpolating influences from the ideal region among the forces that causally determine the real world's details" (pp. 520–21). Others, however, might reject all supernaturalism and still insist that evidence for the truth of religion is to be found empirically in the religious experience. If supernaturalistic belief were not involved in the religious experience, that is, if it were possible for one accepting a purely naturalistic account of all one's experiences still to regard some of them as *religious* experiences, then the *fallacy of false attribution* would not occur.

The crucial question arises, therefore, as to the possibility of defining religion in naturalistic terms. Supernaturalistic or transcendental belief of some kind is commonly regarded as essential in religion, both in popular thought and also in the traditional theo-

[1] Vol. XIV. (1917), pp. 653–60. See also, for discussion of the *fallacy of false attribution,* the author's book, *The Biological Foundations of Belief* (Boston, 1921), Chs. II., III.

logical accounts such as those based upon Plato or Kant. The burden of proof, consequently, rests upon any one who goes contrary to the accepted views. Many have attempted, however, to define religion without including any specific sort of supernaturalistic belief; and I propose to examine some of these attempts and to point out wherein they are fallacious.

Those who try to define religion err frequently in two ways. In the first place, philosophers and theologians are apt to define religion as it is *for them personally,* not as it is for people in general. In the second place, philosophers and theologians may sometimes define religion as they think it *ought to be* for all mankind, not as it is actually found to be in general human experience. It is historians and psychologists of religion who are the best guides in the search for a correct definition, for they examine the institutions, ceremonies, and personal experiences which are commonly called religious.

Historians of religion and psychologists who concern themselves with religious experience agree rather generally that religion, though manifesting itself variously, from inarticulate experiences of individuals to socially sanctioned creeds and institutions, is always characterized by the presence of certain specific beliefs. Anthropologists tend at present to agree in accepting some such account of the earliest form of religion as Mr. Marett gives in his book, *The Threshold of Religion;* and, according to Mr. Marett, religion in its earliest, preanimistic stage consists of belief in a vaguely defined, unseen "power," out of which belief there arise acts of appeasing and persuading and making use of this "power." "To begin with," says Mr. Marett, "the religious eye perceives the presence of *mana* here, there, and everywhere. . . . Whatever the word may originally have signified . . . . it stands in its actual use for something lying more or less beyond the reach of the senses—something merging on what we are wont to describe as the immaterial or unseen (p. 118). James, similarly, in a study of religion upon the highest level, says that religion consists of the "belief that there is an unseen order, and that our supreme good lies in harmoniously adjusting ourselves thereto."[2] So, at the two extremes of religious development, the lowest and the highest, we find, as these two definitions indicate, that religion is characterized by belief in some sort of supernatural reality. Mere belief in the existence of this supernatural realm, however, does not in itself constitute religion. There is in religion the further belief that some sort of human adjustment to this reality is advisable, as James states in the definition quoted above; and in practise such belief issues in overt acts of worship. The objects of

[2] *The Varieties of Religious Experience,* p. 53.

religious belief, differentiating it from other kinds of belief, are, then, of two classes: first, some sort of supernatural order of reality, capable of sustaining a more or less personal relationship with man; and, second, certain acts and attitudes towards this order of reality, acts regarded in the lower religions as efficacious in gaining the aid of the unseen powers, and in the higher religions, acts of adjustment to the unseen order. This would pass as a minimum definition of religion, a statement of what is necessary and no more than is necessary to constitute religion. Religion, further, depends for its existence upon the existence of the *beliefs* in the above-mentioned religious objects, not necessarily upon the existence of the objects themselves.

A wholly adequate justification of my definition of religion would involve the exhibition of supernaturalistic belief in all instances of what, by general consent, is called religion. The procedure might be a wholly empirical one, based upon a historical and psychological study of races and of individuals who have manifested the external signs of religion during the course of history, and who continue to do so at the present time. Such a study would be long and arduous, however; and, besides, many such studies have already been made. I shall limit myself, therefore, to an examination of certain definitions of religion that explicitly exclude the element of supernaturalistic belief; and I shall show that such belief is implied in these very attempts to deny its necessity.

In one of his early articles[3] Professor Leuba denied that belief is essential in religion. He says: "We have in this essay insisted upon the absolute divorce which must be recognized between intellectual beliefs and religion" (p. 314). "Religion has become—or is coming to be—the conglomerate of desires and emotions springing from the sense of sin and its release" (p. 321). But here religion is said to involve belief in sin, a belief that does not occur in the merely moral life. "Sin" does not occur in the vocabulary of secular ethics. A sense of sin implies belief in a "higher," unseen order, together with the belief that maladjustment to this order exists. Consequently, Professor Leuba does not here escape defining religion in terms of supernaturalistic belief.

Others who attempt to define religion without including supernaturalistic belief may be criticised similarly. Thus Mr. Crawley, in his book, *The Tree of Life*, says that belief is not essential in religion. He says: "Religion may arise and subsist without any belief either in God or the soul" (p. 178). "The source of religious feelings and their constant support is not the belief in 'spirits'"

[3] "A Study of the Psychology of Religious Phenomena," *American Journal of Psychology*, Vol. VII. (1895-96), pp. 309-385.

(p. 185). "The religious emotion is no separate feeling, but that tone or quality of any feeling which results in making something sacred. . . . Consecration—the making sacred—of elemental facts, so noticeable both in primitive and civilized life, is the normal result of the religious impulse, and of this alone" (p. 209). Then Mr. Crawley's problem becomes that of defining sacredness. He finds sacredness characteristic of the elemental facts of life, such as birth, marriage, death, and burial. "The vital instinct, the feeling of life, the will to life . . . is the origin of religion" (p. 214). Thus, at the last, Mr. Crawley does not define religion apart from supernaturalistic belief, not necessarily belief in definite spirits or in God, but in a mysterious power, that of life. The "feeling of life" which, for him, constitutes religion, is not such an attitude as that, for example, of the modern scientist who gives a mechanistic account of life, but is a belief in life as a mysterious supernatural fountain of power. Sacredness can not be defined apart from belief in a supernatural area of reality. Birth, marriage, death, and burial, regarded merely as physiological and social processes, possess no sacredness. Belief that supernatural power is manifested in such processes renders them sacred.

Although in one of his early articles, from which I quoted above, Professor Leuba defined religion without including the element of belief, in one of his later works[4] he very definitely includes belief as a necessary constituent. Further, all who admit the relevance of the question of truth and error in religion, thereby admit the presence of belief as a universal and necessary factor. Except where belief or judgment occurs, the predicates "true" and "false" do not apply at all.

Buddhism is an instance of a religion which might *seem* to be completely atheistic, that is, without any belief in God. In practise, however, this is not the case. Pure Buddhism is more a philosophy than a religion, while in Buddhism as actually practised as a religion the Buddha himself is deified. Consequently, Buddhism may come under my definition of religion by virtue of added elements. Moreover, one may maintain, as Professor Leuba does,[5] that original Buddhism, though disregarding gods, did involve belief in a transcendent psychic power. And Professor Hocking[6] regards Buddhism as having what would pass for a god, that is, the law of Karma, which is the moral order of the universe.

The religion of Humanity, which positivism offers, might be cited as an instance of a religion that contradicts my definition.

[4] *A Psychological Study of Religion.* See especially pp. 9, 10, 52.

[5] *Ibid.*, p. 289.

[6] W. E. Hocking, *The Meaning of God in Human Experience*, p. 333.

"The religion of Humanity," says the positivist Mr. Harrison,[1] ". . . insists that the normal object of religious reverence lies, . . . not in the Incomprehensible, but in the Comprehensible; not in the Universe, but in this planet; not in the Absolute, but in the Relative; not in the Supernatural, but in the Natural; not in the Divine, but in the Human World." My criticism is, that the religion of Humanity, so called, is not properly a religion at all according to accepted usage of the term. Even Mr. Harrison admits this, for he says, "*Education* would be a more significant and precise phrase to use of Positivism, if we could purge *education* from its purely intellectual connotation" (Preface, p. xviii).

M. Sabatier, in his *Outlines of a Philosophy of Religion*, defines religion in terms of "feeling," and says that no element of belief is necessarily present. Beliefs, he says (p. 8), may die out, but religion will go on forever. Religion is "the feeling of dependence which every man experiences with respect to universal being" (pp. 21, 22). "This feeling of our subordination thus furnishes the experimental and indestructible basis of the idea of God" (p. 22). "The feeling of our dependence is that of the mysterious presence of God in us" (p. 23). Such a definition as M. Sabatier's does not, however, escape the admission of an element of belief. A psychological analysis of one of these experiences of "dependence on universal being" reveals in the experience a belief, however indistinct and inarticulate, in the reality of a religious object—a belief in "the mysterious presence of God in us." M. Sabatier says (pp. 23, 24) that "the material universe is not the principle of sovereignty to which it is possible for man to submit," and that the practise of religion is an "act of confidence and communion with the universal Spirit." Here is clearly involved belief in the reality of "universal Spirit," as opposed, for example, to universal matter; and this is a distinct case of belief in a religious object.

Professor Höffding, in his *Philosophy of Religion*, tries to differentiate religious experiences from other experiences without reference to belief. "Religious experience is essentially religious feeling," he says (p. 106); and religious feeling is "the feeling which is determined by the fate of values in the struggle for existence" (p. 107). Any "cosmical vital feeling" is religious feeling, according to Professor Höffding (p. 110). The doctrines, dogmas, and cults in which religion has come to be expressed are not literal, he says, but figurative. "The religious consciousness expresses itself by means of more or less figurative ideas" (p. 242). "Religious ideas . . . give figurative form and expression to other sides of the soul's life than those which are served by intellectual ideas" (p. 243).

[1] Frederic Harrison, *The Positive Evolution of Religion*, p. 212.

Professor Höffding even says that the various religious conceptions of God, immortality, and the like, have originated historically "in combinations of figures" (p. 243).

Two criticisms may be brought against such a position. In the first place, it is impossible to differentiate the religious consciousness from other, non-religious experiences without introducing the factor of belief. If "cosmical vital feeling" is to be called religious feeling, and not merely emotion of an esthetic sort, it is so only by virtue of a belief as to the source of the experience—a belief that a supernatural significance attaches to the experience. In the second place, even though some of the religious legends and dogmas have now become merely symbolical for a portion of present-day worshippers, the dogmas did not as a matter of historical fact originate as symbols. A literal significance was originally attached. Moreover, a literal significance is still ascribed to them by the majority of worshippers. How long would even symbols remain if there were no literal believers?

Even for those who do take all religious dogmas symbolically, religion is not definable apart from belief in a class of supernatural objects or in a single supernatural object. A symbol, in order to be a symbol, must be a symbol *of something*. The worshipper who takes the dogmas as symbols, and does not believe them literally, still believes that they are symbols of *something* real or realizable, though not capable of being expressed except through poetic, imaginative symbolism. Furthermore, the objects symbolized are supernatural objects, existing beyond the world that the sciences study. Professor Höffding himself admits this, for he says: "If we could and ought to uphold no other views of existence than those which scientific inquiry can construct and prove, then the axiom of the conservation of value must fall to the ground. Science is not in a position to produce out of itself a religious faith" (p. 244).

An effort is sometimes made to define religion in terms of faith, and to regard faith as something entirely distinct from ordinary belief. Thus Ritschlianism, claiming with Pascal that "the heart has reasons which reason does not know," bases religion on faith as a form of religious knowledge entirely different from scientific, factual beliefs. Faith, however, is a mental process open to ordinary psychological analysis; and upon analysis it is found to consist of belief in the reality of some object or in the truth of some proposition, along with an accompanying emotional state of trust or confidence. Faith in God involves belief in God's existence, together with confidence in His goodness and care. This latter notion is illustrated in the non-religious life by the case, for example, of faith in the curative properties of medicine. Often the term "faith" is ex-

tended in its theological usage to mean belief in the reality of something for which there is no empirical evidence. Tennyson's lines in "In Memoriam" express this idea:

> We have but faith: we can not know;
> For knowledge is of things we see.

But faith in this sense of the word still includes the element of belief, just as it must do in any other legitimate usage of the term.

There has been frequently in history, just as at the present time, a strong tendency to find the essence of religion in personal experiences of a mystical sort. Furthermore, it might seem to some people that, when defined in terms of mystical experiences, religion is defined without the inclusion of belief as a requisite element. This, however, is not the case. Upon analysis mysticism is found to consist of a strongly marked emotional state, together with a conviction or strong belief that there is a divine significance attaching to the experience. At least *after the experience* there is present in the mind of the mystic this belief as to the divine source and significance of the experience.

Though supernaturalistic belief of some sort occurs in all religious experiences properly so called and in all accurate definitions of religion, it might be claimed, nevertheless, that those persons ought to be called religious whose reactions to the universe as a whole, to the cosmic drift of things, were serious and reverent, even though their philosophical views were naturalistic. The majority of scientists would probably be included in this class. The man of high moral ideals and serious purposes, especially if his life is touched with deep emotion at the thought of the total cosmic situation, ought hardly to be called irreligious, perhaps, even though he lacked all the usual religious beliefs. Such a man is certainly not irreverent; but it would be more accurate, however, to call such a man, not religious, but moral merely, with esthetic emotions coloring his morality. Regard for correct usage of the term requires that religion be defined in such a way as to include supernaturalistic belief.

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REVIEWS AND ABSTRACTS OF LITERATURE

La Filosofia Contemporanea. GUIDO DE RUGGIERO. Seconda Edizione. 2 vols. Bari: Gius. Laterza & Figli. Pp. 271, 292.

A completely objective survey of recent European philosophy has not yet been written, and perhaps never will be written. Such

books as have thus far been written are *perspectives* of recent philosophy defined by the doctrinal and geographical location of the writer. That Signor De Ruggiero lives far from current American philosophy both in body and in mind, is most clearly indicated by his apportionment of space. He divides contemporary philosophy by the principle of nationality, allotting 120 pages to Germany, 125 to France, 160 (including the Appendix) to Italy, and 80 to "Anglo-American" philosophy. James and Royce receive about five pages each, Baldwin two pages, Charles Peirce one page, and Dewey one page, no other American being mentioned at all. There is evidence of the same perspective in the extent of the author's reading. Although the first edition of the present work did not appear until 1912, there is no evidence of the author's being familiar with anything of James's after the *Pragmatism* (1907), or of Royce's after the *Studies in Logical Theory* (1903). Among British thinkers, there is no mention of Whitehead, Alexander or G. E. Moore; while Russell is barely alluded to as an exponent of logistics. The strangest omission of all, in view of the author's doctrinal bias, is that of Bosanquet. This writer's *Logic* obtains a brief and disparaging mention in company with those of Mill and Bradley, but his other writings are ignored entirely. Although Italian readers will thus derive from this book a very imperfect and misleading knowledge of current pholosophy in England and America, this does not prevent the English or American reader from finding the book a useful guide to the current philosophy of continental Europe. Contemporary German philosophy has been reviewed so frequently that this portion of the book is valuable as an interpretation rather than as a history. But the summaries of French and Italian (including Neo-Thomistic) philosophy are unique and illuminating, and constitute the chief merit of the book.

In its general method and intent the book is not an historical exposition, but a criticism and constructive argument. The author is a Neo-Hegelian and he reads Neo-Hegelianism into and out of the whole course of recent philosophical development. Thus Hegel's greatness lay in his giving a metaphysical interpretation to Kant's great discovery of the *a priori* synthetic rôle of thought. It remained for the Neo-Hegelians to purge this view of dualism and transcendence of every sort, and so to perfect the philosophy of "absolute immanence." This step could not be taken until after the classical idealism had been supplemented and even momentarily eclipsed by the naturalistic and empirical movement. This latter movement accomplished two things: it proved that the rigor and autonomy of the special sciences must be respected; and, by reducing materialism

to subjectivism, it provided a chapter in the idealistic conception of nature. The new idealism did not, however, arise in the home of the old. The German Neo-Kantians of all descriptions, Cohen, Rickert, Windleband and the rest, lost their way and wandered from the path. It was left to strangers of other lands to assume the succession and proclaim the true doctrine. These apparent transplantations of idealism which flourished better in a foreign soil evidently puzzle the author, since idealism is, like all true philosophy, an outgrowth of the national life, and can not, strictly speaking, be transplanted. The solution lies in regarding idealism as the independent outcropping through the medium of national life of the same essential spirituality. In any case, the true successors of Kant and Hegel, the true exponents of the immanent, concrete and historical idealism, have been Lachelier and Weber in France, Baillie in England, Royce in America ("the most vigorous of Anglo-American philosophers"), and Croce and Gentile in Italy.

From a doctrinal and geographical point of view other than the author's this book is not an account of contemporary philosophy, but of nineteenth century philosophy. For the author the primary object of philosophy is to establish a spiritual view of the world against the inroads of skepticism, materialism and secularism; which was, in a sense, its object during the last century. In the interest of this cause the author is satisfied with the traditional speculative and *a priori* methods of philosophy; and he speaks with the traditional accent of authority and outraged dignity when he has occasion to chastise the various forms of the naturalistic and empiricist heresy. It is therefore inevitable that the most characteristic development of contemporary philosophy in England and America should be lost upon him. Their genial qualities must strike him as flippant and scandalous, and their rigorous qualities as unedifying and destructive. He must necessarily fail to see what may strike another observer as the most significant and wholesome symptom of twentieth century philosophy, an effort at greater precision, clearness, openness of mind and respect for fact. It is the same desire to rid philosophy of cant, verbalism, and apologetic bias that has moved thinkers otherwise so wide apart as the pragmatists and the exponents of logistics. It has moved the realists of England and America. It has led Bergson to limit his speculation to the immediate vicinity of some definite and special scientific question. It has led to the development of *Gegenstandstheorie* with Husserl and Meinong. It has led even the idealists themselves, and notably such thinkers as Royce in America and the Neo-Kantians in Germany, to pursue methodology, and to develop new and intimate connections with natural science. This

desire does not and can not obtain adequate recognition in De Ruggiero's Italian and Neo-Hegelian philosophical perspective.

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La Philosophie Geométrique de Henri Poincaré. LOUIS ROUGIER. Paris: Alcan. 1920. Pp. 208.

This book starts from the thesis that sciences, according to traditional logic, consist either of rational truths, *a priori*, eternal, universal, analytic, and necessary, or of empirical truths, *a posteriori*, capable of revision, singular, synthetic and contingent. Kant's doctrine of the *a priori* synthetic judgment was an attempt to mediate between these positions, but unsuccessful on account of the complicated intellectual machinery involved. The correct position is that of the "geometrical conventionalism" of Poincaré.

The book is divided into two parts, of which the first deals with the logical and mathematical prolegomena to Poincaré's theory. The author aims at minimizing the amount of mathematical knowledge necessary to understand Poincaré's exposition, and while he is reasonably successful, there still remain enough formulæ and technicalities to puzzle readers who have not some mathematical attainments.

The second part of the book gives the theory of "conventions" and Poincaré's criticism of other positions, from empiricism to Kantianism. The author identifies Poincaré's position with his own, and professes to add nothing but certain confirmations from the recent utilization of non-Euclidean and four-dimensional geometries in problems of the physics of relativity.

M. Rougier has the true Frenchman's gift for clear exposition, but one misses at times the brilliant passages that enlighten, by striking figures of speech, Poincaré's own expositions, particularly in his later works such as the *Science et Méthode* and the *Dernières Pensées*. For the American reader, a frank acceptance of Poincaré's self-classification as a pragmatist would contribute to an understanding of his point of view. But of course M. Rougier was writing for a French audience. It is, however, good to have attention directed as often as possible to work like Poincaré's for there has never been his equal as an exponent of the theory of knowledge in relation to concrete instances of scientific achievement.

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JOURNALS AND NEW BOOKS

BRITISH JOURNAL OF PSYCHOLOGY. Vol. X., Part 4. July, 1920. *Note on Professor J. Laird's Treatment of Sense Presentations* (pp. 285–89) : J. E. TURNER. – We must supplement the realism which Professor Laird advocates by regarding sense data as always fragments or aspects of the physical world, determined (for psychology) to be sense data by these conditions under which they are always and necessarily presented to a consciousness debarred by its finitude from an immediate apprehension of the whole reality. *Reply to Mr. J. E. Turner's Note* (pp. 290–92) : JOHN LAIRD. – It is irrelevant to point out that sense data have a certain evanescent continuance. *A Performance Test under Industrial Conditions* (pp. 292–309) : S. WYATT and H. C. WESTON. – An investigation was carried on in the cotton industry under the auspices of the Industrial Fatigue Research Board. The process under investigation was bobbin-winding. Each winder came from her own winding-frame to the test frame and pieced the 50 pairs of ends as quickly as possible. Individual differences decrease as a result of practise, but the day's work has a variable effect upon different individuals. *Two Examples of Child Music* (pp. 310–11) : WILLIAM PLATT. – Two examples found since the author's book was published are given. *A Voice Reaction Key* (pp. 312–14) : ERNEST W. BRAENDLE. – The apparatus is described with a diagram. *The Distribution and Reliability of Psychological and Educational Measurements* (pp. 315–18) : WILLIAM MCCLELLAND. – "Raw" standard deviations should be corrected by subtracting the value of σ_m^2/m from its square. *The General Factor Fallacy in Psychology* (pp. 319–26) : GODFREY H. THOMSON. – The utter invalidity of deducting a general factor from hierarchical order unless absolutely perfect. *Fluctuations in Mental Efficiency* (pp. 327–44) : B. MUSCIO. – Possibly as a consequence of the production of fatigue, continuous mental activity, such as is involved in academic study, definitely lowers the capacity for certain mental tests. *Publications Recently Received.*

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NOTES AND NEWS

The first session of the Institute of Politics, dealing with the general subject of international relations (see this JOURNAL, Vol. XVIII, No. 2, Notes and News), will be held at Williamstown, Mass., from Thursday, July 28, until Saturday, August 27, 1921.

A partial list of those who will deliver lecture courses extending throughout the session follows: The Right Honorable Viscount James Bryce, England; Baron Sergius A. Korff, Russia; Stephen Panaretoff, Bulgaria; and, unless unavoidably detained, Luis M. Drago, Argentina; and Josef Redlich, Austria.

A partial list of those who will conduct round-table conferences is as follows: Isaiah Bowman, director of the American Geographical Society; Professor Archibald C. Coolidge, of Harvard; Norman H. Davis, former Under Secretary of State; Professor James W. Garner, of the University of Illinois; Professor Jesse S. Reeves, of the University of Michigan; Professor Frank W. Taussig, of Harvard; and Professor George G. Wilson, of Harvard. Professors E. H. Haskins and R. H. Lord, of Harvard, will probably alternate with Mr. Bowman and Professor Coolidge, respectively.

In addition to the formal lectures and round-table conferences there will be occasional addresses by visitors of national and international reputation.

The lectures and addresses will be open to the public and all are cordially invited.

The round-table conferences will be limited to duly enrolled members of the Institute. Each member will be assigned to one or two round-table courses and will be given an opportunity to indicate the course or courses which he prefers to take. The round-table conferences will be conducted after the manner of graduate seminars. It is the intention to so limit the number in each group and to so assign the members of the Institute to the various groups that each member will be able to contribute to the discussion.

Those desiring further information can obtain it from the secretary of the Institute, Professor Karl Ephraim Weston, of Williams College.